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Acoustic Position Calibration of the KM3NeT Neutrino Telescope

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KM3NeT is a European Consortium with the goal to build and operate a neutrino telescope with a volume of several cubic kilometres at the bottom of the Mediterranean Sea. It will be composed at least 300 vertical structures of several hundred metres length, named detection units (DU), anchored on the seabed and kept vertical with a buoy.

The DU will host optical sensors able to detect the faint Cherenkov light emitted in the deep sea from the tracks of charged particles originating from collisions of the neutrinos with nuclei in the sea water or the rock below. A precise knowledge of the optical sensor relative positions of not worse than 20 cm is needed for an accurate reconstruction of the charged particle tracks. Since the marine currents cause movements of the DUs and thus a displacement of the optical sensors of up to several ten meters from their nominal positions, an Acoustic Positioning System (APS) is necessary to monitor their positions in deep sea. The telescope will employ an APS composed of acoustic transceivers at fixed positions on the sea floor and acoustic receivers (hydrophones) along each DU. The hydrophone positions are calculated by triangulation using the times travel of acoustic signal between emitter and receiver.

The poster will present the acoustic positioning system designed for KM3NeT and in particular the innovative technologies used for transducers, electronics, and signal processing.

for the collaboration

representing the KM3NeT Consortium

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